

Application No. 10/728,210
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Remarks: General

The specification has been amended to add thereto a notation of the claim to benefit made in the ADS of this application as to the prior U.S. provisional application.

The claims have been amended by rewriting Claim 1, and adding Claims 41-81, to separately cover specific embodiments of this invention. Claims 2 and 7 have been re-written to improve matters of grammar and syntax, and Claims 9-12 and 25-40 have been canceled without prejudice to or disclaimer of the subject matter thereof.

No new matter is added by the amendment of Claim 1 or by the addition of Claims 41-81. The subject matter of Claims 10-12 has been incorporated into Claim 1. Each of new Claims 41-81 corresponds to an original claim as follows:

New	Orig	New	Orig	New	Orig
41	8	47, 62, 80	16	54, 69	3
42, 75	9	48, 63, 81	17	55, 70	4
43, 76	10-12	49, 64	18-19	56, 71	5
44, 52, 77	13	50, 65	20	57, 72	6
45, 60, 78	14	51, 66	21-24	58, 73	7
46, 61, 79	15	53, 68	2	59, 74	8
				67	23, 24

The amendments to Claims 2 and 7 are not related to patentability inasmuch as they are made solely for the purpose of improving matters of grammar and syntax.

The Examiner has indicated that Claims 8, 23 and 24 would be allowable if rewritten in independent form, including all of the limitations of the base claim and any intervening claim. Claim 8 has been rewritten in independent form as Claim 41, and Claims 23 and 24 have been rewritten in independent form as Claim 67. The submission of Claim 41, and Claims 42-51 as dependent thereon, and the submission of Claim 67, and Claims 68-81 as dependent thereon, are thus not related to patentability as Claims 41 and 67 correspond to original claims that have been indicated to be allowable. As each of the claims that are dependent on Claims 41 and 67, respectively, also

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correspond to other original claims, the submission of these dependent claims is also not related to patentability.

The fee due by reason of the addition of Claims 41~81 is calculated on the attached sheet and may be charged to Deposit Account No. 04-1928 (E.I. du Pont de Nemours and Company). The cancellation of Claims 9~12 and 25~40 has been taken into account in the calculation of the fee payment. If the calculation on the attached sheet is in error, please charge or credit Deposit Account No. 04-1928 accordingly.

A petition under 37 CFR §1.136 for a three-month extension of time to respond to the Examiner's action is enclosed, the fee for which should be charged to Deposit Account No. 04-1928.

If any fee other than or in addition to those mentioned specifically above is required to authorize or obtain consideration of this response, please charge such fee to Deposit Account No. 04-1928.

Claims 1~8, 13~24 and 41~81 are now active in the application. Applicant hereby requests reconsideration and further examination of the application in view of the reasons it has set forth below for allowance of the claims.

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Remarks: Detailed Action

I.

In Item 4, the Examiner has rejected Claims 1 and 7 under 35 U.S.C. §112 as being indefinite in view of the recitation of "metal/metalloid alloys". Applicant presumes that the Examiner intended to reject Claim 2 on this basis instead of Claim 1, and responds accordingly.

As both Claims 2 and 7 have both been amended to recite --alloys of metal and metalloids-- instead of "metal/metalloid alloys", Applicant respectfully requests that the Examiner withdraw the rejection of Claims 2 and 7 under 35 U.S.C. §112.

II.

In Item 6, the Examiner has rejected Claims 1~7, 16~19 and 23 under 35 U.S.C. §102(e) as being anticipated by US 02/094,382 ("Imai").

In Item 8 the Examiner has rejected Claims 1~7, 9 and 14~17 under 35 U.S.C. §102(e) as being anticipated by US 6,653,043 ("Hanabata-043").

In Item 11, the Examiner has objected to Claims 8, 10~12, 23 and 24 as being dependent on a rejected base claim, and has indicated that those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

In accordance with the Examiner's indication of allowability concerning Claims 10~12, the limitations of those claims have been incorporated into Claim 1, and Claim 9 has been cancelled. Applicant therefore respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. §102(e) of Claim 1 as amended, and of Claims 2~7 and 14~19 as dependent thereon.

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III.

In Item 7, the Examiner has rejected Claims 1~5, 7 and 13~19 under 35 U.S.C. §102(e) as being anticipated by US 6,534,235 ("Hanabata-235").

As the limitations of Claims 10~12 have been incorporated into Claim 1, as noted above, Applicant respectfully requests that the Examiner withdraw the rejection under 35 U.S.C. §102(e) of Claim 1 as amended, and of Claims 2~5, 7 and 13~19 as dependent thereon.

Applicant has submitted new Claims 52~66 wherein new Claim 52 corresponds to original Claim 13. Applicant respectfully submits that Claims 52~66 are patentable over Hanabata-235 as that reference does not teach or suggest any of the monomeric components now recited in Claim 52.

IV.

In Item 10, the Examiner has rejected Claims 20~22 under 35 U.S.C. §103(a) as being unpatentable over US 6,769,945 ("Chang") in view of Imai. In view of the amendments to Claim 1 as described above, Applicant respectfully requests that the Examiner withdraw the rejection of Claims 20~22 under 35 U.S.C. §103(a).

V.

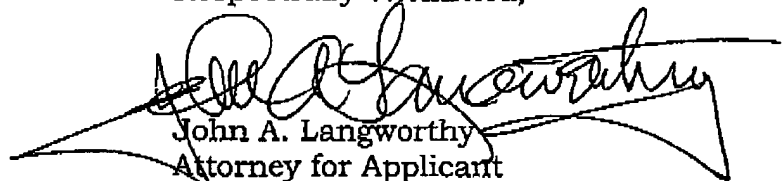
In Item 11, the Examiner has objected to Claims 8, 10~12, 23 and 24 as being dependent on a rejected base claim, and has indicated that those claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claim.

The limitations of Claims 10~12 have been added to Claim 1, as described above. Claim 8 has been rewritten in independent form as Claim 41 with Claims 42~51 dependent thereon. Claims 23 and 24 have been rewritten in dependent form as Claim 67 with Claims 68~81 dependent thereon.

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In view of the foregoing, Applicant submits that all of the Examiner's objections and rejections have been properly traversed, and that the pending claims are in condition for allowance, request for which is hereby respectfully made.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "John A. Langworthy", is written over a horizontal line. The signature is stylized and cursive.

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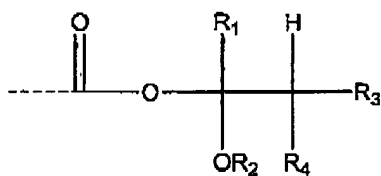
Appendix A

(i) Amendments
 in marked-up form to
 Claims 1, 2 and 7,

(ii) New Claims 41-81, and

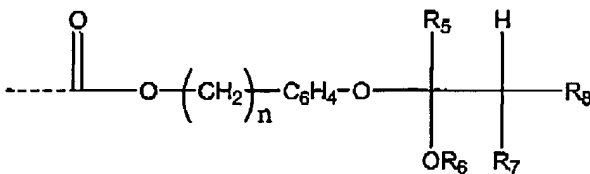
(iii) Status of all pending claims
 (1-8, 13-24 and 41-81)

1. (currently amended) A positive imageable, particulate-filled photoresist composition comprising (a) at least one positive imageable photopolymer system, and (b) about 1 to about 70 vol% particulates, wherein the photopolymer system comprises a (meth)acrylate polymer or copolymer that comprises one or more of the pendant groups as described by Formulae I, II and III, to-wit:



Formula I

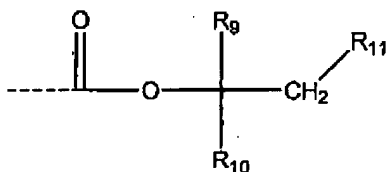
wherein R_1 is hydrogen or $\text{C}_1\text{-C}_6$ alkyl; R_2 is $\text{C}_1\text{-C}_6$ alkyl; and R_3 and R_4 independently are hydrogen or $\text{C}_1\text{-C}_6$ alkyl; and wherein R_1 and R_2 , or R_1 and R_3 , or R_2 and R_3 may be joined to form a 5-, 6-, or 7-membered ring;



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Formula II

wherein n is 0-4; R₅ is hydrogen or C₁-C₆ alkyl; R₆ is C₁-C₆ alkyl; and R₇ and R₈ independently are hydrogen or C₁-C₆ alkyl; and wherein R₅ and R₆, or R₅ and R₇, or R₆ and R₇ may be joined to form a 5-, 6-, or 7-membered ring; and



Formula III

wherein R₉ is hydrogen or lower alkyl; R₁₀ is lower alkyl; and R₁₁ is hydrogen or lower alkyl; and wherein a lower alkyl group includes alkyl groups having 1 to 6 linear or 3 to 6 cyclic carbon atoms.

2. (currently amended) The composition of Claim 1 wherein the particulates are selected from the group consisting of glass, oxides, carbides, nitrides, metals, metal alloys, metalloids, metalloid alloys, metal/metallloid-alloys of metals and metalloids, carbon and mixtures thereof.

3. (original) The composition of Claim 2 wherein the oxides are selected from the group consisting of aluminum oxides, silicon oxides, tin oxides and mixtures thereof.

4. (original) The composition of Claim 1 wherein the particulates are selected from the group consisting of transition metals and their alloys.

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5. (original) The composition of Claim 4 wherein the transition metals are selected from the group consisting of Al, Cu, Ag, Au, Pt, and Pd.

6. (original) The composition of Claim 1 wherein the particulates are selected from the group consisting of zinc, thallium, germanium, cadmium, indium, tin, antimony, lead, bismuth, and their alloys.

7. (currently amended) The composition of Claim 1 wherein the particulates are selected from the group consisting of ~~metal/metalloid~~ alloys of metals and metalloids.

8. (original) The composition of Claim 2 wherein the carbon is in the form of carbon nanotubes.

9~12. (canceled).

13. (original) The composition of Claim 1, wherein the photopolymer system comprises acid labile monomeric components selected from:

tetrahydropyranyl methacrylate (or acrylate);
tetrahydropyranyl p-vinylbenzoate;
1-ethoxy-1-propyl p-vinylbenzoate;
4-(2-tetrahydropyranyloxy)benzyl methacrylate (or acrylate);
4-(1-butoxyethoxy)benzyl methacrylate (or acrylate);
t-butyl methacrylate (or acrylate);
neopentyl methacrylate (or acrylate);
1-bicyclo{2,2,2}octyl methacrylate (or acrylate) and their derivatives;
1-bicyclo{2,2,1}heptyl methacrylate (or acrylate) and their derivatives;
1-bicyclo{2,1,1}hexyl methacrylate (or acrylate) and their derivatives;
1-bicyclo{1,1,1}pentyl methacrylate (or acrylate) and their derivatives; and

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1-adamantyl methacrylate (or acrylate) and their derivatives.

14. (original) The composition of Claim 1 further comprising additives selected from the group consisting of solvents and viscosity aids.

15. (original) The composition of Claim 1 wherein the particulates comprise about 20 to about 70 vol% of the composition.

16. (original) The composition of Claim 1 wherein the particulates are less than 100 microns in their longest dimension.

17. (original) The composition of Claim 1 wherein the particulates are less than 10 microns in their longest dimension.

18. (original) The composition of Claim 1 in the form of a printable paste.

19. (original) The composition of Claim 1 in the form of a film.

20. (original) An electron field emitting film comprising the composition of Claim 1.

21. (original) A field emission triode comprising the film of Claim 20.

22. (original) A field emission display comprising the film of Claim 20.

23. (original) A lighting device comprising the film of Claim 20.

24. (original) A vacuum electronic device comprising the film of Claim 20.

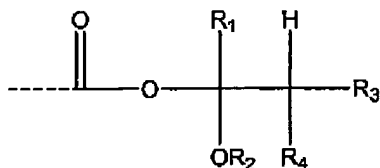
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25~40. (canceled)

41. (new) A positive imageable, particulate-filled photoresist composition comprising (a) at least one positive imageable photopolymer system, and (b) about 1 to about 70 vol% carbon nanotubes.

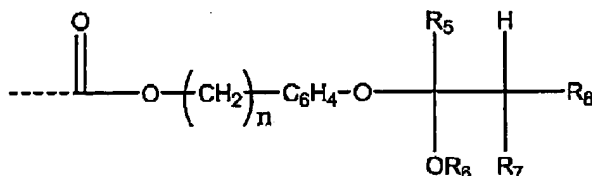
42. (new) The composition of Claim 41 wherein the photopolymer system is selected from the group consisting of novolac-diazonaphthoquinone resins.

43. (new) The composition of Claim 41 wherein the photopolymer system comprises a (meth)acrylate polymer or copolymer that comprises one or more of the pendant groups as described by Formulae I, II and III, to-wit:



Formula I

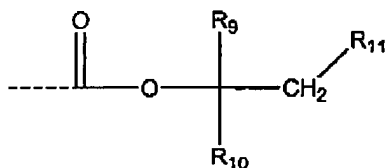
wherein R₁ is hydrogen or C₁-C₆ alkyl; R₂ is C₁-C₆ alkyl; and R₃ and R₄ independently are hydrogen or C₁-C₆ alkyl; and wherein R₁ and R₂, or R₁ and R₃, or R₂ and R₃ may be joined to form a 5-, 6-, or 7-membered ring;



Formula II

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wherein n is 0-4; R₅ is hydrogen or C₁-C₆ alkyl; R₆ is C₁-C₆ alkyl; and R₇ and R₈ independently are hydrogen or C₁-C₆ alkyl; and wherein R₅ and R₆, or R₅ and R₇, or R₆ and R₇ may be joined to form a 5-, 6-, or 7-membered ring; and



Formula III

wherein R₉ is hydrogen or lower alkyl; R₁₀ is lower alkyl; and R₁₁ is hydrogen or lower alkyl; and wherein a lower alkyl group includes alkyl groups having 1 to 6 linear or 3 to 6 cyclic carbon atoms.

44. (new) The composition of Claim 41, wherein the photopolymer system comprises acid labile monomeric components selected from:

- tetrahydropyranyl methacrylate (or acrylate);
- tetrahydropyranyl p-vinylbenzoate;
- 1-ethoxy-1-propyl p-vinylbenzoate;
- 4-(2-tetrahydropyranyloxy)benzyl methacrylate (or acrylate);
- 4-(1-butoxyethoxy)benzyl methacrylate (or acrylate);
- t-butyl methacrylate (or acrylate);
- neopentyl methacrylate (or acrylate);
- 1-bicyclo{2,2,2}octyl methacrylate (or acrylate) and their derivatives;
- 1-bicyclo{2,2,1}heptyl methacrylate (or acrylate) and their derivatives;
- 1-bicyclo{2,1,1}hexyl methacrylate (or acrylate) and their derivatives;
- 1-bicyclo{1,1,1}pentyl methacrylate (or acrylate) and their derivatives; and

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1-adamantyl methacrylate (or acrylate) and their derivatives.

45. (new) The composition of Claim 41 further comprising additives selected from the group consisting of solvents and viscosity aids.

46. (new) The composition of Claim 41 wherein the particulates comprise about 20 to about 70 vol% of the composition.

47. (new) The composition of Claim 41 wherein the particulates are less than 100 microns in their longest dimension.

48. (new) The composition of Claim 41 wherein the particulates are less than 10 microns in their longest dimension.

49. (new) The composition of Claim 41 in the form of a printable paste or a film.

50. (new) An electron field emitting film comprising the composition of Claim 41.

51. (new) A field emission triode, a field emission display, a lighting device, or a vacuum electronic device comprising the film of Claim 50.

52. (new) A positive imageable, particulate-filled photoresist composition comprising (a) at least one positive imageable photopolymer system, and (b) about 1 to about 70 vol% particulates, wherein the photopolymer system comprises a polymer that comprises one or more acid labile monomeric components selected from the group consisting of:

tetrahydropyranyl methacrylate (or acrylate);
1-ethoxy-1-propyl p-vinylbenzoate;
4-(2-tetrahydropyranyloxy)benzyl methacrylate (or acrylate);
4-(1-butoxyethoxy)benzyl methacrylate (or acrylate);
neopentyl methacrylate (or acrylate);

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1-bicyclo{2,2,2}octyl methacrylate (or acrylate) and their derivatives;

1-bicyclo{2,2,1}heptyl methacrylate (or acrylate) and their derivatives;

1-bicyclo{2,1,1}hexyl methacrylate (or acrylate) and their derivatives;

1-bicyclo{1,1,1}pentyl methacrylate (or acrylate) and their derivatives; and

1-adamantyl methacrylate (or acrylate) and their derivatives.

53. (new) The composition of Claim 52 wherein the particulates are selected from the group consisting of glass, oxides, carbides, nitrides, metals, metal alloys, metalloids, metalloid alloys, alloys of metals and metalloids, carbon and mixtures thereof.

54. (new) The composition of Claim 53 wherein the oxides are selected from the group consisting of aluminum oxides, silicon oxides, tin oxides and mixtures thereof.

55. (new) The composition of Claim 52 wherein the particulates are selected from the group consisting of transition metals and their alloys.

56. (new) The composition of Claim 55 wherein the transition metals are selected from the group consisting of Al, Cu, Ag, Au, Pt, and Pd.

57. (new) The composition of Claim 52 wherein the particulates are selected from the group consisting of zinc, thallium, germanium, cadmium, indium, tin, antimony, lead, bismuth, and their alloys.

58. (new) The composition of Claim 52 wherein the particulates are selected from the group consisting of alloys of metals and metalloids.

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59. (new) The composition of Claim 53 wherein the carbon is in the form of carbon nanotubes.

60. (new) The composition of Claim 52 further comprising additives selected from the group consisting of solvents and viscosity aids.

61. (new) The composition of Claim 52 wherein the particulates comprise about 20 to about 70 vol% of the composition.

62. (new) The composition of Claim 52 wherein the particulates are less than 100 microns in their longest dimension.

63. (new) The composition of Claim 52 wherein the particulates are less than 10 microns in their longest dimension.

64. (new) The composition of Claim 52 in the form of a printable paste or a film.

65. (new) An electron field emitting film comprising the composition of Claim 52.

66. (new) A field emission triode, a field emission display, a lighting device or a vacuum electronic device comprising the film of Claim 65.

67. (new) A lighting device or a vacuum electronic device that comprises an electron field emitting film that comprises a positive imageable, particulate-filled photoresist composition comprising (a) at least one positive imageable photopolymer system, and (b) about 1 to about 70 vol% particulates.

68. (new) The device of Claim 67 wherein the particulates are selected from the group consisting of glass, oxides, carbides, nitrides, metals, metal alloys, metalloids, metalloid alloys, alloys of metals and metalloids, carbon and mixtures thereof.

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69. (new) The device of Claim 68 wherein the oxides are selected from the group consisting of aluminum oxides, silicon oxides, tin oxides and mixtures thereof.

70. (new) The device of Claim 67 wherein the particulates are selected from the group consisting of transition metals and their alloys.

71. (new) The device of Claim 70 wherein the transition metals are selected from the group consisting of Al, Cu, Ag, Au, Pt, and Pd.

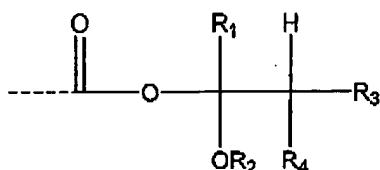
72. (new) The device of Claim 67 wherein the particulates are selected from the group consisting of zinc, thallium, germanium, cadmium, indium, tin, antimony, lead, bismuth, and their alloys.

73. (new) The device of Claim 67 wherein the particulates are selected from the group consisting of alloys of metals and metalloids.

74. (new) The device of Claim 73 wherein the carbon is in the form of carbon nanotubes.

75. (new) The device of Claim 67 wherein the photopolymer system is selected from the group consisting of novolac-diazonaphthoquinone resins.

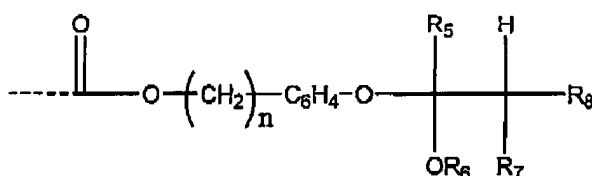
76. (new) The device of Claim 67 wherein the photopolymer system comprises a (meth)acrylate polymer or copolymer that comprises one or more of the pendant groups as described by Formulae I, II and III, to-wit:



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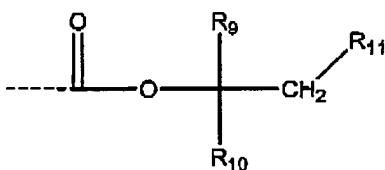
Formula I

wherein R_1 is hydrogen or C_1 - C_6 alkyl; R_2 is C_1 - C_6 alkyl; and R_3 and R_4 independently are hydrogen or C_1 - C_6 alkyl; and wherein R_1 and R_2 , or R_1 and R_3 , or R_2 and R_3 may be joined to form a 5-, 6-, or 7-membered ring.



Formula II

wherein n is 0-4; R_5 is hydrogen or C_1 - C_6 alkyl; R_6 is C_1 - C_6 alkyl; and R_7 and R_8 independently are hydrogen or C_1 - C_6 alkyl; and wherein R_5 and R_6 , or R_5 and R_7 , or R_6 and R_7 may be joined to form a 5-, 6-, or 7-membered ring.



Formula III

wherein R_9 is hydrogen or lower alkyl; R_{10} is lower alkyl; and R_{11} is hydrogen or lower alkyl; and wherein a lower alkyl group includes alkyl groups having 1 to 6 linear or 3 to 6 cyclic carbon atoms.

77. (new) The device of Claim 67 wherein the photopolymer system comprises acid labile monomeric components selected from:

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tetrahydropyranyl methacrylate (or acrylate);
tetrahydropyranyl p-vinylbenzoate;
1-ethoxy-1-propyl p-vinylbenzoate;
4-(2-tetrahydropyranyloxy)benzyl methacrylate (or acrylate);
4-(1-butoxyethoxy)benzyl methacrylate (or acrylate);
t-butyl methacrylate (or acrylate);
neopentyl methacrylate (or acrylate);
1-bicyclo{2,2,2}octyl methacrylate (or acrylate) and their
derivatives;
1-bicyclo{2,2,1}heptyl methacrylate (or acrylate) and their
derivatives;
1-bicyclo{2,1,1}hexyl methacrylate (or acrylate) and their
derivatives;
1-bicyclo{1,1,1}pentyl methacrylate (or acrylate) and their
derivatives; and
1-adamantyl methacrylate (or acrylate) and their derivatives.

78. (new) The device of Claim 67 wherein the composition further comprises additives selected from the group consisting of solvents and viscosity aids.

79. (new) The device of Claim 67 wherein the particulates comprise about 20 to about 70 vol% of the composition.

80. (new) The device of Claim 67 wherein the particulates are less than 100 microns in their longest dimension.

81. (new) The device of Claim 67 wherein the particulates are less than 10 microns in their longest dimension.